Docket No. 80383(47762)

THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No:

In re Patent Application of:
Yukihiko Minamida et al.

Application No.: 10/668,964 | Confirmation No.: 1481

Filed: September 24, 2003 | Art Unit: 1796

For: SOLVENT-FREE MOISTURE-CURABLE HOT MELT URETHANE RESIN COMPOSITION | Examiner: R. A. Sergent

REPLY BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Reply Brief is being timely filed on February 7, 2008.

The Arguments start on page 2 of the Reply Brief.

I. ARGUMENT

A. Claims 1-4 are not rendered obvious under 35 U.S.C. §103(a) by U.S. Patent No. 6,844,073 to Helmeke in view of U.S. Patent No. 4,574,793 to Lee and *Polyurethane Handbook: Chemistry – Raw Materials – Processing – Applications – Properties*; Hanser Publishers; New York; 1985; pp. 96-97 to Oertel because there is no motivation to combine the references.

The appellants strongly disagree with the Examiner's assertion on p. 4 of Examiner's Answer that **Helmeke**'s discussion of open time provides the motivation to incorporate the sulfonic acid disclosure of **Lee** or **Oertel** to **Helmeke**. The Examiner conceded that **Helmeke** is silent regarding the incorporation of sulfonic acids into the adhesive composition, but argued that sulfonic acids are known inhibitors and cited **Lee** and **Oertel** as support. (Ex. Ans. p. 4, lns. 1-3). However, as **Oertel** discloses, there are many inhibitors that can be used in isocyanate reactions:

> As inhibitors HCL, benzoylchloride, p-toluene sulfonic acid and others are added in the ppm region to the isocyanate.

(Oertel, p. 96). With respect to the motivation to combine the references, the Examiner asserted that **Helmeke**'s discussion of open time provides the motivation to incorporate the sulfonic acid disclosure of **Lee** or **Oertel** to **Helmeke**:

> It is additionally noted that Helmeke et al. teach at column 1, lines 29-43 that it is advantageous to control the open time of the adhesive, therefore, the position is taken that this disclosure provides additional motivation to utilize components that would control or moderate the open time, such as the known inhibitors of the secondary references.

(Ex. Ans. p. 4, lns. 8-15). This argument fails for at least a couple of reasons. First, **Helmeke** makes no mention of using a stabilizer to control open time. In fact, **Helmeke** only mentions

stabilizers in passing, and even then only in terms of protecting the composition from environmental degradation, not in terms of open time:

> The adhesive composition may further other additives e.g., . . . stabilizers. . . Stabilizers, antioxidants and combinations thereof may be added to the adhesive composition to protect it from degradation caused by reaction with oxygen induced by e.g., heat, light, or residual catalyst from the raw materials e.g., the tackifying resin.

(Lee, col. 4, lns. 67-69; col. 5, lns. 27-31). Second, **Lee** discloses that sulfonic acid has no appreciable effect in terms of open time:

> However, even employing MSA [methane sulfonic acid] as a stabilizer, the necessary cure times cannot be achieved **and at the same time maintain satisfactory shelf life or stability for orthopedic applications. Accordingly, it is another aspect of this invention to provide stabilized, catalyzed system that meets the unique demands of this particular application.**

(Lee, col. 4, lns. 59-65). As for **Oertel**, aside from a general teaching that p-toluene sulfonic acid can be used as an inhibitor in isocyanate reactions, no mention is made in relation to open time. Therefore, **Helmeke's** disclosure regarding open time provides absolutely no motivation to combine the references to incorporate the sulfonic acid teaching of **Lee** or **Oertel** with **Helmeke**. Without a reasonable technical basis to combine the references, the prima facie case of obviousness fails.

Furthermore, the reliance on **Oertel** is misplaced because the reaction inhibitor of **Oertel** is used for the preparation of prepolymers, **not the curing reaction** occurring after the preparation of prepolymers as in the claimed invention. In fact, it would be impossible to achieve the effects of the claimed invention if the teachings of **Oertel** were applied to the preparation of prepolymers of the claimed invention. In the claimed invention, the curing reaction occurring after the

preparation of prepolymers is inhibited, not the reaction in the preparation of prepolymers as in **Oertel**. That the claimed invention inhibits the curing reaction is clear from the results of the Examples. Thus, because the inhibited reaction of the claimed invention is different from that of **Oertel**, the no *prima facie* case of obvious is established with the combination of **Helmeke** and **Oertel**.

In addition, the appellants strongly disagree with the Examiner's assertion on p. 5 of the Examiner's Answer that **Lee** teaches the use of polyester derived prepolymers with the combination of morpholine ether catalyst and methane sulfonic acid. In particular, the Examiner noted that **Lee** discloses the use of prepolymers of **von Bonin**, which are prepolymers derived from polyester polyols. However, **von Bonin** discloses not only polyester polyol with an aromatic ring, but also polyester polyol without an aromatic ring, such as the following polyester polyol, and **makes no mention at all with respect to the effects of using polyester polyol with an aromatic ring**:

> The following are mentioned as examples: succinic acid; adipic acid; suberic acid; azelaic acid; sebacic acid; phthalic acid; isophthalic acid; trimellitic acid; phthalic acid anhydride; tetrahydrophthalic acid anhydride; hexahydrophthalic acid anhydride; tetrachlorophthalic acid anhydride; endomethylene tetrahydrophthalic acid anhydride; glutaric acid anhydride.

(von Bonin, col. 4, lns. 63-68). However, **not all polyester polyol are alike in terms of the claimed invention**. In fact, Comparative Example 3 and Example 3 of the February 27, 2006, Declaration ("Declaration II") compared the difference of using polyester polyol with and without an aromatic ring. The importance of selecting polyester polyol with an aromatic ring is clearly obvious from the **improved results of thermal stability melt viscosity and creep resistance**

exhibited by Example 3 over Comparative Example 3. Thus **Lee**, even with the disclosure of **von Bonin** does not provide a teaching of the necessary prepolymers derived from polyester polyols that in combination with **Helmeke** would make the claimed invention obvious.

The applicants have shown here that without a reasonable technical basis to combine the references, the *prima facie* case of obviousness fails.

B. The examples are commensurate in scope with the claimed invention given that aromaticity or lack thereof of the recited polyisocyanate is completely irrelevant to the applicants' unexpected results of (1) thermal stability melt viscosity over time, and (2) creep resistance on standing.

The examples are commensurate with the scope of the claimed invention with respect to the unexpected results shown by the examples. The Examiner's argument, on p. 6 of the Examiner's Answer, that the current examples are not commensurate in scope with the claims is based solely on the recited polyisocyanate. In particular, the Examiner pointed out that the claims cover both aliphatic and aromatic polyisocyanates, and took issue with the fact that all of the examples are based on aromatic polyisocyanates. (Ex. Ans. p. 7, lns. 10-15). However, "appellant is not required to test each and every species within the scope of the appealed claims and compare the same with the closest prior art species." *Ex Parte Winters,* 1988 Pat. App. LEXIS 39, 4-5 (Pat. App. 1988). The appellants need only show "unexpected superiority for representative compounds within the scope of the appealed claims." *Id.*

The Examiner argued that the examples fail for not including aliphatic polyisocyanates because "aliphatic polyisocyanates are less reactive than aromatic polyisocyanates" and, therefore, "important in the instant case where rates or speed of reaction are at issue." (Ex. Ans. p. 7, lns.

15-17). However, "rates or speed of reaction" is entirely irrelevant to the applicants' unexpected results of (1) thermal stability melt viscosity over time, and (2) creep resistance on standing. The thermal stability melt viscosity relates to a state before a moisture-curing reaction and the creep resistance while standing relates to characteristics after a completing moisture-curing reaction.

Specifically, because the thermal stability melt viscosity relates to a state before a moisture-curing reaction, even if the reaction is slow, the effect on the thermal stability melt viscosity is not influenced. Regarding the creep resistance while standing, even if the reaction is slow, the excellent effects of the claimed invention can be obtained after a composition is sufficiently cured. Therefore, a rate or speed of reaction which relates to action during the reaction process does not influence the effects of the claimed invention.

Accordingly, the aromaticity or lack thereof of the recited polyisocyanate is irrelevant to show unexpected results in (1) thermal stability melt viscosity over time, and (2) creep resistance on standing. Therefore, examples need not include both aliphatic and aromatic polyisocyanates in order to determine the stated unexpected results. The current examples are commensurate in scope with the claimed invention.

In addition, the appellants would like to correct the Examiner's misunderstanding of the April 13, 2005, Declaration ("Declaration I"). In particular, the Examiner noted on p. 6 of the Examiner's Answer that "methane sulfonate [of Comparative Example 2 of Declaration I] does not correspond to the claimed acid components." As the record shows, the appellants brought to the Examiner's attention on p. 5 of the September 26, 2005, Amendment that "'methane sulfonate' in the Declaration refers to 'methane sulfonic acid,'" which corresponds to the claimed acid

components.

Further, the appellants strongly disagree with the Examiner's argument on p. 6 of the Examiner's Answer that the results shown in Declaration I are not unexpected. For reference, the examples related to Declaration I are listed below:

- Comparative Example 1: composition including a urethane prepolymer **without** an aromatic ring, and a morpholine ether-based crosslinking catalyst
- Comparative Example 2: composition including a urethane prepolymer **without** an aromatic ring, a morpholine ether-based crosslinking catalyst, and a **sulfonic acid** (methane sulfonic acid)
- Comparative Example : composition including a urethane prepolymer **with** an aromatic ring, and a morpholine ether-based crosslinking catalyst
- Example 1: composition including a urethane prepolymer **with** an aromatic ring, a morpholine ether-based crosslinking catalyst, and a **sulfonic acid** (methane sulfonic acid)

A comparison of Comparative Examples 1 and 2 of Declaration I exhibited the **expected** effect from the use of a stabilizer: a decline in melting viscosity and, consequently, improved thermal stability. However, the decline in thermal stability between Comparative Examples 1 and 2 decreased with time, showing that, even with the incorporation of sulfonic acid, the effect of thermal stability in a conventional composition (i.e., urethane prepolymer without an aromatic ring) decreases with time.

As for the **unexpected** effects, a comparison of Comparative Example 3 and Example 1

showed that incorporating a sulfonic acid to a composition including a urethane prepolymer **with** an aromatic ring and a morpholine ether-based crosslinking catalyst resulted in **a more significant decline** in melting viscosity than the decline exhibited between Comparative Examples 1 and 2. In addition, the composition of Example 1 **maintained a sufficient level of thermal stability for practical use over time**. That is, the effect of thermal stability attributable to sulfonic acid did not decrease with time in Example 1, as in the results of Comparative Examples 1 and 2. Clearly, the examples of Declaration I show **unexpected** effects derived from the **synergy** of combining the claimed components, namely improvement with respect to decline in melting viscosity and thermal stability over time. This synergy is completely unexpected over the prior art.

This shows that not only are the applicants' examples commensurate in scope, but they also show results that are unexpected.

C. The examples are representative of the closest prior art examples.

The Examiner addressed Declaration II on p. 7-8 of the Examiner's Answer. Comparative Examples 1, 2, and 3 of Declaration II are appropriate closest prior art examples as discussed below. In Declaration II, a solvent-free moisture-curable hot melt urethane resin composition corresponding to the claimed invention comprised a urethane prepolymer with an aromatic ring (A), a morpholine ether-based crosslinking catalyst (B), and a sulfonic acid (C).

- Comparative Example 1 is a comparison between a composition of the claimed invention and a composition lacking component (C).

- Comparative Example 2 is a comparison between a composition of the claimed invention and a composition lacking component (B).
- Comparative Example 3 is a comparison between a composition of the claimed invention and a composition lacking the aromatic ring of component (A),

It is obvious from the results of Comparative Examples 1, 2, and 3 that the unexpected improvements of the claimed invention cannot be obtained in cases lacking any one of components (A), (B), or (C). Therefore, the **results of Declaration II show synergistic effects** clearly attributable to the **combination** of (A), (B), and (C).

The appellants strongly disagree with the Examiner's assertion that Comparative Examples 2 and 3 of Declaration II fail as closest prior art examples for lacking morpholine ether or phthalic acid based on polyester polyol. Comparative Examples 2 and 3 are representative of closest prior art examples given that (1) none of **Helmeke**'s examples contain morpholine ether, and (2) Comparative Example 3 specifically lacks phthalic acid based polyester polyol to demonstrate the importance of this component. (App. Br. p. 18, lns. 12-13, 17-19).

With respect to Comparative Example 3, the appellants explained on p. 16, lines 4-6, of the Appeal Brief that, in order to show the unexpected results attributable to phthalic acid based polyester polyol, Example 3 and Comparative Example 3 were identical with the exception of terephthalate polyester polyol. The appellants note that the Examiner failed to respond to this explanation other than to merely repeat that "Comparative Example (3) lacks the phthalic acid based polyester polyol." (Ex. Ans. p. 8, lns. 4-5).

With respect to the morpholine ether catalyst, while **Helmeke** discloses morpholine ether

catalyst, the closest prior art **embodiment** of **Helmeke** does not contain any catalyst. It has long been the law that the Comparative Examples need not cover the entire disclosure of the closest prior art, but only the closest prior art **example,** none of which contain morpholine ether. *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (evaluating unexpected results by comparing the claimed invention to the "embodiment of the closest prior art," not the entire teachings of the closest prior art reference); *also see*, *In re Romenesko*, 1999 U.S. App. LEXIS 2107 (Fed. Cir. 1999); In re Chupp, 816 F.2d 643 (Fed. Cir. 1987); In re Johnson, 747 F.2d 1456, 1460 (Fed. Cir. 1984); In re Zeidler, 682 F.2d 961, 964 (C.C.P.A. 1982).

In light of the well-settled law with respect to the criticality of the examples, Comparative Examples 2 and 3 are appropriate representative examples of the closest prior art **examples** of the closest prior art reference. In that regard, Comparative Examples 1, 2, and 3 demonstrate a synergy that results from the combination of components (A), (B), and (C), and demonstrate unexpected results in (1) thermal stability melt viscosity over time, and (2) creep resistance on standing.

II. CONCLUSION

The appellants are seeking relief from an obviousness rejection based on references lacking motivation for their combination, and assert that the Declaration examples of the claimed invention show unexpected results over the prior art. The final rejection of the claims should be withdrawn and the claims should stand allowed and passed to issue.

In the event this paper is not timely filed, appellant hereby petitions for an appropriate extension of time.

In view of the above explanation clarifying the unexpected results achieved by the claimed invention over the prior art, the appellants believe the pending application is in condition for allowance.

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Respectfully submitted,

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